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ABSTRACT

The effects of economic and non-economic variables on college persistence are examined. An attempt is made to draw upon both economic theory and Tinto's Student Integration Theory in order to enhance the understanding of the role of finances on the process of persistence. The direct and indirect effects of ability to pay on persistence in the context of such non-economic variables as significant others, academic skills and abilities, academic integration, social integration, and goal commitment are explored. The study sample came from the National Longitudinal High School and Beyond 1980 Senior Cohort. Subjects included 1,375 college students at public four-year institutions. The study shows effects of ability to pay are significant not only when the variable is considered alone, but also when other variables are incorporated into the analysis. Results support the hypothesis that ability to pay moderates the effect of goal commitment upon persistence in a manner consistent with the expanded model. No support was found for the presumed academic integration goal commitment interaction effect. There is a significant effect on persistence by the interaction between satisfaction with faculty and satisfaction with institutional prestige, but none by skills and abilities. Findings indicate that the ability to pay is best understood as an external factor that directly affects decisions to persist. Tables and figures are included. Contains 74 references. (Author/SM)

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Exploring the Effects of Ability-to-Pay on Persistence in College[1]

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Exploring the Effects of Ability-to-Pay on Persistence in College

Abstract

This study examines the effects of economic and non-economic variables on college persistence. The study represents an attempt to draw upon both economic theory and Tinto's Student Integration Theory in order to enhance our understanding of the role of finances on the process of persistence. This is accomplished with a model that incorporates the major constructs of the Student Integration Model while making explicit the potential role of financial variables. The model is then tested using logistic regression analysis. The research design is predictive, and analyses are conducted with a sample of 1,375 college students who were attending public 4-year institutions in spring 1982. The sample is drawn from the national longitudinal High School and Beyond 1980 Senior Cohort Data Base. While the results are largely supportive of the Student Integration Model and research on the effects of finances, findings also indicate that financial variables moderate the effect of Goal Commitment upon Persistence. Implications for theory and student financial aid policy are explored.

INTRODUCTION

During the last 20 years a variety of federal, state, and institutional student aid programs have evolved in the expectation that they will enhance access to college, widen choice among institutions, and increase persistence (Stampen, 1980). The cost of these programs was approximately $20 billion per year by the early 1980s. A principal assumption underlying this multibillion dollar investment is that ability to pay plays an important role in student decisions about college (Jackson, 1986; Jensen, 1981; Wenc, 1983).

Despite previous research, understanding of the impact of finances on college persistence decisions is still quite limited (Stampen & Cabrera, 1986). Although a large body of literature exists on persistence, little of it examines the effects of ability to pay in the context of non-economic variables known or presumed to affect persistence (Pantages & Creedon, 1978).

This study explores the effects of finances by incorporating ability to pay to the variables in the most developed and frequently tested theory of student persistence, namely Tinto's Student Integration Theory. Specifically, we explore the direct and indirect effects of Ability-to-Pay on Persistence in the context of such important non-economic variables as Significant Others, academic Skills and Abilities, Academic Integration, Social Integration, and Goal Commitment. We also explore the implications of our findings for persistence theory and for student financial aid policy.

Literature Review

The theoretical framework guiding this study incorporates two perspectives. The first is the theory of persistence/attrition commonly known as Student Integration Theory. The second is the theory of targeted subsidies based on ability to pay; these income-conditioned subsidies seek to reduce, if not eliminate, financial barriers to college attendance through the provision of direct grants, low-interest loans, and subsidized work-study jobs.

Student Integration Theory

Building on Spady's work (1971, 1970), Tinto (1975, 1982, 1987) formulated a theory explaining the process that motivates individuals to leave colleges and universities before graduating. According to Tinto's theory, attrition results from interactions over time between students and institutions. Basically, the theory hypothesizes that persistence is determined by the match between an individual's motivation and academic ability and the institution's academic and social characteristics. The theory

asserts that, other factors being equal, the matching between the individual's characteristics and those of the institution shape two underlying individual commitments--to the goal of college completion and to the college itself. Accordingly, the stronger the goal of college completion and/or the greater the level of institutional commitment, the higher is the probability that a student will complete college.

According to Tinto (1975), a student's goal commitment is determined by the degree to which he/she becomes integrated into the academic life of the institution, while a student's institutional commitment is shaped by the degree to which he/she becomes integrated into the social life of the institution. For Tinto (1987), the indicators of academic and social integration differ. While academic performance and interactions with faculty and staff reflect the extent of a student's integration into the academic system of the institution, participation and satisfaction with extracurricular activities and peer-group interactions reflect the extent to which the student identifies with the social life of the institution.

The theory also posits that academic integration and social integration are affected by precollege commitment toward completing a college degree as well as precollege commitment toward investing effort, money, and time in seeking a college degree (Tinto, 1975). In this respect, the model argues that family background, individual attributes, and high school performance determine precollege commitments. Later, the student's college experiences affect the degree and intensity of these goal and institutional commitments.

Tinto's theory also argues that a student's institutional and goal commitments while attending college are affected by gender and perceptions about quality of the institution (Tinto, 1982). Specifically, intellectual development and social integration into the academic system are assumed to affect attrition behavior among females, while poor academic performance is the main predictor of persistence among males (Tinto, 1975). Tinto's theory also postulates that perceptions of institutional quality rest in part on information concerning the likely occupational and income opportunities open to an institution's graduates.

The usefulness of the Student Integration Model as a framework to explore the effect of finances on college persistence is limited. Although the Student Integration Model indicates that ability to pay is important in shaping educational goals and in the selection of institutions, the theory is silent about the role of ability to pay once students enroll. Apparently, the justification for this omission seems to rest on studies indicating that aided students show no higher propensities to persist than do non-aided students (c.f. Tinto,

1987, pp.80-81). However, interpreting this finding as an indicator of the lack of effects of ability to pay is incorrect. Recent research on student aid has shown that non-aided students come from higher family income backgrounds as compared to need-based aided students, and that student aid is heavily targeted to students from low-income families' (Jackson, 1988; Stampen and Cabrera, 1988; Stampen, 1985). Further, these studies also indicate that student aid is effective in compensating for the disadvantage of low income by making low income students as likely to persist as more affluent students (Leslie & Brintnman, 1988; Murdock, 1987; Stampen & Cabrera, 1986, 1987). Consequently, these results actually support the view that ability to pay does affect college persistence, and leads us to expand our research focus by combining Tinto's theory with the economic rationale for providing subsidies based on ability to pay, subsidies designed both to facilitate access and increase persistence in college.

Research Evidence

Tinto's Student Integration Theory has been subjected to a considerable amount of empirical testing, and these tests largely support the predictive validity of the model as far as the role of non-economic variables is concerned (Pascarella, Terenzini, & Wolfle, 1986; Pascarella & Chapman, 1983; Chapman & Pascarella, 1983; Pascarella, Duby, & Iverson, 1983; Pascarella & Terenzini, 1983, 1980; Aitken, 1982; Munro, 1981; Terenzini & Pascarella, 1978, 1977; Getzlaf, Gordon, Kearney, & Blackwell, 1984; Nora, 1987).

For example, Pascarella, Terenzini and associates, employing an instrument based on Tinto's constructs of academic and social integration (Pascarella & Terenzini, 1980), found that goal commitment and institutional commitment are consistent predictors of withdrawal behavior (Pascarella & Terenzini, 1980; Terenzini, Lorang, & Pascarella 1981). Similarly, Getzlaf et al. (1984) reported that academic integration, academic performance, goal commitment, and institutional commitment discriminated between dropouts and persisters among undergraduate students who attended Washington State University during 1978. Anderson (1981), based on a sample drawn from the National Longitudinal Study of the High School Class of 1972, found that academic experiences and peer influences affect the odds of persistence among students who entered two-year community/junior colleges. On the other hand, Theophilides and Terenzini (1981) found perceptions of instructional quality to be highly associated with the quantity and quality of informal contacts with faculty among students enrolled at a residential university in New York .

Results are mixed, however, when the structural process underlying the theory is examined. Munro (1981), using a sample drawn from the National Longitudinal Study of the High School

Class of 1972, reported that path analysis yielded results largely consistent with the Student Integration Model for all but one construct--Institutional commitment was not found to affect persistence. On the other hand, Pascarella and Terenzini (1983) reported that path analysis, conducted on a sample of freshman in a private residential university, produced results entirely consistent with the theory when the whole sample was analyzed. However, they found no connection between goal commitment and persistence when the model was applied to females. Pascarella, Duby, and Iverson (1983), using a sample of students attending a nonresidential university, reported that neither goal commitment nor institutional commitment affected persistence. Moreover, neither of these commitments was found to be affected by academic integration and social integration. Further, in contradiction to the Student Integration Model, they found that the effect of social integration on persistence was negative. On the other hand, Pascarella and Chapman (1983), using a sample of freshmen from 11 postsecondary institutions, found that path analysis yielded results consistent with the theory. However, inconsistencies were reported when the data were disaggregated by type of institution. More recently, Nora (1987) found that neither academic integration nor social integration had significant effects on retention among Chicano students attending three community colleges in southern Texas.

Research on the Student Integration Model has paid some attention to the role of ability to pay on college persistence, though with mixed results. Munro (1981) found that the effect of socioeconomic status was mainly indirect, mediated through other variables on the Student Integration Model. Similar results were reported by Pascarella and Chapman (1983). On the other hand, Pascarella, Duby and Iverson (1983) reported no significant effect of parental financial support on persistence. Similarly, Pascarella and Terenzini (1986) found that SES exerted neither direct or indirect effects on college persistence.

Mixed results could be attributed to some methodological constraints inherited to these studies. With the exception of Pascarella, Terenzini, and associates, researchers failed to provide evidence of the extent to which variables employed were reliable and valid for the particular Student Integration Model's construct under analysis (Anderson, 1981; Munro, 1981; Aitken, 1982; Getzlaf et al., 1984; Nora, 1987). For instance, Munro (1981) employed two variables to operationalize the construct of Institutional Commitment[2] that a pilot study conducted by the authors found to have concurrent validity with indicators of academic integration as measured by Pascarella and Terenzini's (1980) instruments. Inconsistences about the effects of ability to pay can also be attributed to restriction of range on SES. As noticed by Pantages and Creedon (1978) studies focussing on single institutions are likely to mask the effect of socioeconomic status on persistence since the student population

is prone to be relatively uniform with respect to this variable. However, the importance of SES does emerge when sample data come from several institutions. Another potential limitation is the use of path analysis when the dependent variable, attrition, is dichotomized. It has been shown that the application of path analysis on dummy dependent variables is likely to violate the assumptions of functional specification and homoscedasticity upon which OLS rests (Hanusheck & Jackson, 1977; Fienberg, 1983). Consequently, the estimated OLS parameters may not only underestimate the effect of relevant variables (Aldrich & Nelson, 1984), but the estimated model may also yield inconsistent predictions such as negative probabilities (Hanusheck & Jackson, 1977).

Although research on the Student Integration Model has contributed to the understanding of the role that academic ability, motivation, and the institution play on persistence, more research is still needed on the potential role ability to pay can exert on motivational and institutional variables while the student is attending college. This topic is particularly relevant from a policy analysis perspective given the substantial public investment aimed at stimulating enrollment and preventing attrition among economically disadvantaged students (Stampen & Cabrera, 1986, 1988; Voorhees, 1985; Jensen, 1981).

Ability to Pay Approach

A substantial part of public investment in higher education since 1965 has been directed at removing economic barriers to college attendance, at preventing low-income students from dropping out because of the lack of financial resources, and at giving college students greater choice among institutions. This focus reflects the widely discussed goals of student financial aid programs in the 1970s--their emphasis in this context on the goals of access, choice, and persistence (Stampen, 1980).

The theory behind the provision of public subsidies for higher education is that, because of positive externalities resulting from educational investment, less education will be demanded by individuals than the level of demand that is optimal from society's point of view. To stimulate additional demand, society subsidizes the costs of higher education through below-cost tuition (Bowen, 1977; Hansen & Weisbrod, 1971; Joint Economic Committee, 1969; Orwig, 1971; McMahon & Geske, 1982). To assure that young people who can profit from college are not deprived of the opportunity to attend college because of their inability to pay, additional subsidies are made available to assure that a socially optimal level of educational investment occurs all across the spectrum of family incomes (Breneman & Nelson, 1981; Hansen & Weisbrod, 1971; Hoenack, 1971; McMahon & Geske, 1982). These subsidies, which take the form of direct grants, low-interest loans, and subsidized work-study employment,

are all directed toward students who can demonstrate financial need.

Although methods for determining the extent of financial need are complex, as a general rule family income characteristics can be used to estimate student financial need, i.e., the lower the family income or the socioeconomic status, the greater the need (Hansen & Lampman, 1983; Jensen, 1981, Baum, 1987). This criterion has received support from research. For example, Astin (1975) reported that students from low socioeconomic background were more likely to withdraw from college than students from higher socioeconomic background. The National Center for Education Statistics (1984) reports that, among 4-year college entrants, low level SES background students were less likely to persist as compared to students from higher SES backgrounds during the first two years of college education.

Underlying the provision of student aid is the assumption that the decisions of young people (and their parents) about attending and persisting in college reflect rough comparisons of the present value of benefits from college attendance with those of high school completion, relative to the costs of college attendance (Becker, 1964; Hansen, 1963; Manski & Wise, 1983). Thus, need-based student financial aid, by lowering the cost of attendance, will not only facilitate enrollment in college but also reduce or eliminate financial reasons for dropping out.

Research Evidence

Most studies examining the impact of ability to pay on persistence focus on the effects of individual aid programs, by type of award (Iwai & Churchill, 1982; Jensen, 1981; Astin, 1975), by the importance of the source of support to the student (Iwai & Churchill, 1982; Jensen, 1981; Astin, 1975), and by the total amount of aid resulting from specific award amounts (Voorhees, 1985; Jensen, 1981). Disagreement remains over the influence of particular forms of aid on attrition. Voorhees (1985) found that all forms of federal support, either alone or in combination, were equally effective in preventing students from dropping out. Iwai and Churchill (1982) observed that persisters relied on more sources of support than non-persisters. However, Astin (1975) found that grants and work-study awards had positive effects on persistence while loans had negative effects when directed to low-income students. Moreover, Astin found that any type of financial aid was more effective alone than when combined with other forms. Astin's results were replicated to some extent by Terkla (1984), Herndon (1984), and Odutola (1982).

Relatively few studies have attempted to measure the net effects of student financial aid on attrition. A recent study by Baum (1987) that employed national longitudinal data (High School

and Beyond, 1980-1982) in a test of the economic "fairness theory" found that low parental income, while controlling for academic ability, was a powerful predictor of attrition more because of low aspirations to attend college than because of lack of student financial aid. Recent research (Stampen & Cabrera, 1986, 1988) compares attrition between aided and non-aided students while controlling for the separate effects of academic ability, ethnology, gender, and age. The findings of Stampen and Cabrera are similar to those of the Baum study: the receipt of aid is positively related to persistence (i.e., financial support enhances persistence among economically disadvantaged students relative to affluent students); however, weak academic performance in high school and minority group status, variables that often overlap low socioeconomic status, decrease persistence. Similar results were reported by Murdock (1987) who conducted a meta-analysis on forty-six studies examining the relationship between student aid and attrition.

Studies assessing the impact of financial aid have several shortcomings. Except Baum's, no effort has been made to link these studies to any theory of attrition despite recommendations of Tinto (1975, 1987), and Pantages and Creedon (1978). Further, these studies typically fail to consider the role of the institution in shaping persistence decisions (Tinto, 1987). Moreover, most findings cannot be generalized to predict the effects of currently operating student system because they are based on data for single institutions. Even in those cases where findings are based on national samples (Terkla, 1984; Astin, 1975), the results may no longer hold because they rely on data predating the major expansion of student aid programs in the early 1970s (Voorhees, 1985); the exception is Baum and the National Center for Education Statistics' 1984 report since both relied on the 1980 High School and Beyond data. Finally, research designs have not been formulated either to uncover the specific relationship between ability to pay and college persistence, or to indicate the relative importance of financing among the various determinants of persistence.

A Model of Ability to Pay and College Persistence

Figure 1 graphically displays the propositions under empirical examination. The model employed here, while somewhat constrained by the availability of data, permits exploring the impact of Ability to Pay on persistence in combination with other important variables. As a whole, the model draws from the Student Integration Model, Bean's (1982) findings concerning the effect of support from others on college persistence, Voorhees's (1985) research, and the results of a series of pilot studies we conducted concerning the role of Ability to Pay and Satisfaction toward Institutional Prestige on persistence[3].

Insert Figure 1 about here

The model starts with all those variables the Student Integration Model presumes to affect persistence decisions while the student is attending college; namely, Skills and Abilities, Academic Integration, Social Integration, Goal Commitment and Institutional Commitment. Consequently, the model takes as given Academic Integration, Social Integration, Institutional and Goal Commitments, and Skills & Abilities. It introduces Institutional Prestige and Significant Others' as critical independent variables, and most important, it incorporates Ability to Pay as a variable that is presumed to moderate the effects of commitments, academic performance, and institutional variables on persistence. The model also presumes that attitudes toward institutional prestige affect decisions to persist. In turn, these attitudes are affected by a student's experiences with the academic life of the institution.

Ability to Pay is hypothesized to moderate the effect of Academic Integration and Social Integration. It affects the former by relieving students of the need to compromise their academic commitment by having to work long hours or be concerned about financial matters. It affects the latter by removing or reducing the barriers to full participation in the social life of the institution. Ability to Pay is also presumed to moderate the effects of Institutional Commitment and Goal Commitment on persistence. This expectation is based on both theory and research. Tinto (1975, 1982, 1987) argues that student perceptions can be influenced by economic and other external factors which can affect "commitments to the goal of college completion and to the institution in which he is registered" (1975, p.98). Voorhees (1985) adds that economic need negatively affects college academic performance, a variable that the Student Integration Theory regards as an indicator of Academic Integration.

Hypotheses

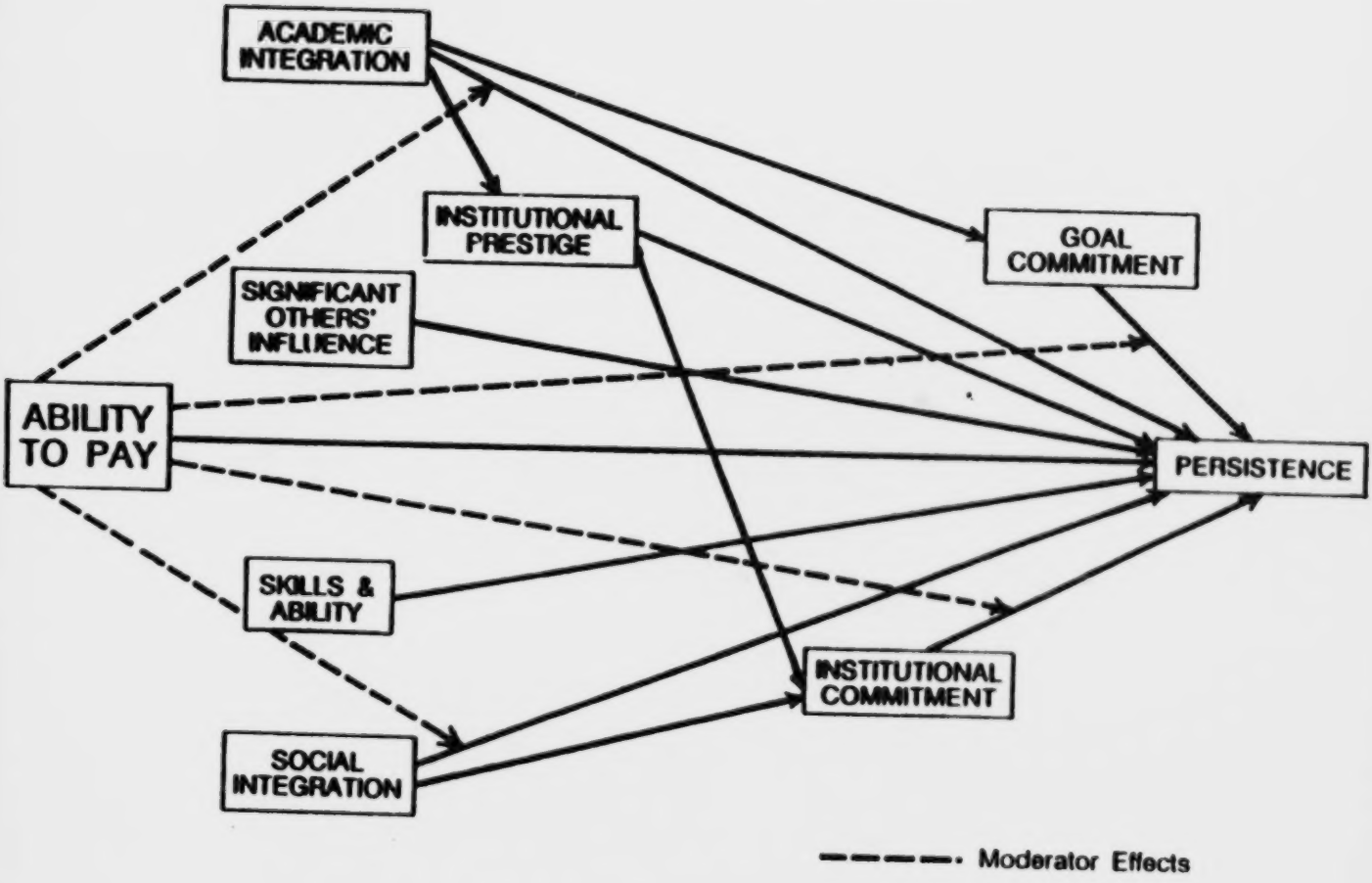
The hypotheses guiding this research can be summarized as follows:

H1: Consistent with the Student Integration Model (Tinto, 1975, 1987) and with Astin's (1975) research, it is hypothesized that the higher the goal commitment, the higher the propensity to persist.

H2: Consistent with the Student Integration Model, it is hypothesized that the greater the institutional commitment, the greater the propensity to persist.

Figure 1

Effects of Ability to Pay on College Persistence



H3: Consistent with the Student Integration Model, it is hypothesized that the more a student becomes integrated into the social and academic components of the institution, the higher the propensity to persist. It is further hypothesized that the higher the Academic Integration and the higher the Goal Commitment, the higher the propensity to persist. Likewise, the higher the Social Integration and the higher the Institutional Commitment, the higher the propensity to persist.

H4: Consistent with the Student Integration Model, it is hypothesized that the higher the skills & abilities, the higher the student's propensity to persist.

H5: Consistent with research by Bean (1982) and by Nora (1987), it is hypothesized that the greater the student's encouragement from significant others, the higher the propensity to persist.

H6: Consistent with the Student Integration Model (Tinto, 1975), it is hypothesized that the higher the satisfaction with the prestige of the institution, the higher the propensity to persist. It is also hypothesized that perceptions of institutional prestige interact with academic integration and institutional commitment; that is, the higher the academic integration and the satisfaction with institutional prestige, the higher the propensity to persist. The higher the institutional commitment and satisfaction with institutional prestige, the higher the propensity to persist.

H7: The probability of persisting decreases as the student perceives that the costs of education exceeds the his/her ability to pay.

H8: Ability to pay also moderates the effects of goal commitment, institutional commitment, academic performance, and social integration on persistence. Thus, the higher the ability to pay the greater the effect of Goal Commitment, Institutional Commitment, Academic Performance and Social Integration on a student's propensity to persist.

The Data Base

The sample for this study was drawn from the National Longitudinal High School and Beyond 1980 Senior Cohort (Jones et al., 1986a). The High School and Beyond study follows about 12,000 high school seniors. The sample is a matched one, and information is collected every two years during the spring. Consequently, data are available for 1980, 1982, and 1984. The

data base contains extensive information on students and institutions. The base year survey asked for personal, family, and educational background as well as for educational expectations and aspirations before high school seniors attended college. Follow-up surveys (Jones et al., 1986a) focused on the type of institution students enrolled in, satisfaction with several characteristics of the institutions they attended, reasons for withdrawal, types of financial support, socioeconomic status, changes in educational goals, and academic performance. For this study, subjects' self-reported information (Jones et al., 1986a) was complemented and validated with data from the Postsecondary Education Transcript data base (Jones et al., 1986b).

The Sample

The subjects of this research were 1,375 college students who were attending public four year institutions at the time the first follow-up took place (Spring 1982).

Several procedures were employed to secure a reliable sample. Only those subjects who indicated in the first follow up they were currently attending public four year institutions and enrolled in academic programs leading to a bachelor degree were originally retained. This criterion yielded 1,767 cases. A computer program was then developed to cross verify information provided by the student in both the first follow-up and the second follow-up concerning the institution in which they were enrolled in the spring of 1982. A total of 157 subjects failed to provide information about the name of the institution they attended in 1982 in either the first or the second follow-up. Another 194 subjects reported conflicting information about the institution in which they were enrolled in the spring of 1982. Consequently, these 351 cases were excluded.

For the remaining 1,416 cases, information provided by students concerning type of institution attended in the spring of 1982 and academic status was validated against information from the Postsecondary Education Transcript data base (Jones et al., 1986b). Six cases were excluded because institutional records indicate they attended vocational and public two-year institutions in the spring of 1982. Another 21 cases were dropped because the institution reported no record of attendance. Fourteen cases were also omitted due to conflicting information pertaining to academic status; while the institution did not report a degree, these students declared that they obtained a bachelor degree from the institution within the 1982-84 period. Eight students whose self-reported information led to their classification as non-persister were reclassified as persisters. Institutional records indicate that these subjects had secured a bachelor degree by December of 1984. The analyses, then, focus on the 1,375 remaining cases.

Measurement

Institutional Persistence. The dependent variable in this study is institutional persistence. This construct was measured by a categorical variable. Subjects that either completed a bachelor degree, or were still enrolled in the same institution at the time the second follow-up took place (Spring 1984) were coded "1". Subjects who withdrew from the institution during the 1982-84 period before completing the bachelor program were coded "0".

Independent variables:

Goal Commitment (GC). The student's 1982 report of lowest level of education he/she would be satisfied with, was employed to measure this construct. This variable ranged from 1 (some college education) to 6 (Ph.D. or equivalent).

Academic Integration (AI). Seven indicators were employed to measure this construct. The first was the cumulative GPA reported by the Institution (AI1). GPA ranged from .17 to 4. Results indicate there is a high level of agreement between the self-reported GPA and the institution reported GPA. The correlation between the institution reported GPA and the self-reported GPA is .75. The rest of the indicators were taken from an instrument measuring satisfaction toward the institution which was applied in spring of 1982. These items are satisfaction with faculty (AI2), satisfaction with development of work skills (AI3), satisfaction with intellectual growth (AI4), satisfaction with intellectual life (AI5), satisfaction with quality of instruction (AI6) and satisfaction with curriculum (AI7). Each attitudinal item was measured in a Likert scale ranging from 1 (Very dissatisfied) to 5 (Very satisfied). The pilot study indicates the concurrent validities between these items and the academic integration scales (Pascarella and Terenzini, 1980) range from .35 to .49 (see Table A).

Social Integration (SI). One indicator was employed to assess this construct. This indicator, contained in the first follow-up, reflects the student's satisfaction toward the social component of the institution in which he/she was enrolled in 1982. The pilot study indicated that the concurrent validity between this item and the social integration scale (Pascarella & Terenzini, 1980) was .55. This item was measured in a Likert scale ranging from 1 (Very dissatisfied) to 5 (Very satisfied).

Ability to Pay (AP). Two indicators were employed to measure this construct. The first was satisfaction toward cost of attendance (AP1) as reported by the student in 1982. This variable is dichotomous. A value of 1 was given to dissatisfied subjects and a value of 2 was given to satisfied subjects. The

second was socioeconomic status (AP2) which the National Center for Education Statistics divided into quartiles (Jones et al., 1986a). This variable was computed by the National Center for Education Statistics by equally weighting father's education, mother's education, family income, father's occupation and household items. Data quality assessments (Fetters, Stowe, & Owings, 1984), based on information independently provided by a sample of students and their parents, indicate that the validity of the SES composite is about .84 for the senior cohort sample, while the mean validity coefficients for the SES lowest quartile and the SES highest quartile is .55 and .59, respectively. Analyses conducted by the National Center for Education Statistics (1984) also indicate that SES can be useful to discriminate between persisters and non-persisters, at least during the first two years of college, among those students attending four-year institutions.

Institutional Prestige (IP). One indicator was employed to measure this construct. This indicator, contained in the first follow-up, reflects the student's satisfaction toward the prestige of the institution in which he/she was enrolled. This item was measured in a Likert scale ranging from 1 (Very dissatisfied) to 5 (Very satisfied).

Significant Others' Influence (SO). This construct was measured by a composite made up of all those HS&B items whereby the subject indicated that parents, friends, or teachers encouraged him/her to attend college and by that HS&B item whereby the subject indicated that his/her best friend planned to attend college. This variable ranged from 0 to 6. This information was provided by the subject while in his/her senior high school year. To the extent that support from family and friends is constant across time, it is reasonable to assume that this motivational variable provides a good indicator of the support and encouragement the subject received while attending college.

Skills and Abilities (AB). This construct was measured by means of a cognitive test that was applied to subjects in their high school senior year. The cognitive test score is a composite of vocabulary, reading and math components (Jones et al., 1986a). Scores on this test ranged from 33.7 to 70.6. Estimates by the Educational Testing Service (Rock, Hilton, Pollack, Ekstrom, & Goertz, 1985), for the high school senior cohort, show alpha reliabilities of .84, .80 and .90 for the vocabulary, reading, and math components, respectively.

Summary statistics for each variable are displayed in Table 1.

Insert Table 1 about here

Table 1

Descriptive Statistics and Marginal Distributions

Variables	Count	Cell %	Mean	S.D.
Dependent Variable:				
Non-Persisters	348	25.3	-	-
Persisters	1027	74.7	-	-
Independent Variables:				
Significant Others' Influence (SO)	1287	-	4.89	1.28
Skills & Abilities (AB)	1257	-	54.73	7.62
Goal Commitment (GC)	1344	-	3.97	.80
Academic Integration (AI):				
AI1. Academic Performance	1286	-	2.59	.63
AI2. Faculty	1349	-	4.00	.85
AI3. Work Skills	1344	-	3.88	.91
AI4. Intellectual Growth	1346	-	4.19	.81
AI5. Intellectual Life	1346	-	3.82	.89
AI6. Quality Instruction	1344	-	3.86	.96
AI7. Curriculum	1344	-	3.94	.93
Social Integration (SI)	1347	-	3.91	1.04
Institutional Prestige (IP)	1346	-	3.91	1.00
Ability to Pay (AP):				
AP1. Satisfaction Cost Attendance				
Dissatisfied	388	28.9	-	-
Satisfied	956	71.1	-	-
AP2. Socioeconomic Status				
1st Quartile	319	24.0	-	-
2nd Quartile	251	18.9	-	-
3th Quartile	338	25.4	-	-
4th Quartile	422	31.7	-	-

Data Analyses

The tests of this study's hypotheses were carried on via linear probability models for microdata[4]. For this purpose, the maximum likelihood algorithms, contained in GLIM version 3.0 (Baker & Nelder, 1978), were used. The selection of logistic regression analysis over methods commonly used in earlier college persistence studies, such as OLS, discriminant analysis, path analysis, and LISREL, is dictated by the nature of the distribution of the dependent variable under analysis (persistence)[5]. According to Tinto (1975), logit analysis is an appropriate technique for studying attrition because of "the categorical nature of dropout as a dependent variable" (p. 120). Increasingly, however, investigators have moved to the LISREL model. Yet, it has become apparent that this model is not appropriate because of the nonlinear pattern associated to attrition behavior. In contrast with LISREL, logistic regression analysis not only captures the probabilistic distribution embedded in dichotomized distributions, but also avoids violating the assumptions of homoscedasticity and functional specification that the direct application of either path analysis or LISREL to binary variables are likely to impose (Hanushek & Jackson, 1977). Also Press and Wilson (1978) found logistic regression analysis to be a better procedure than discriminant analysis for both prediction and classification purposes.

Data Analysis Strategy

A three-step strategy was employed to test hypotheses[6] First, a model containing the indicators of ability to pay alone was fitted to the data. This model was estimated to determine whether ability to pay by itself had an effect on college persistence.

The second stage sought to test for the presumed interaction effects among non-economic variables, and to select the model that could be used as a baseline for examining the hypothesized moderating effects of ability to pay. Following recommendations on categorical data analysis by Fienberg (1983), a model building strategy was developed. First, the main effects (or additive) model was first estimated and employed as a baseline[7]. Next, models including both main effects and interaction terms (formed by the cross-products of indicators of Academic Integration and Goal Commitment, and by the cross-products of the indicators of Academic Integration and Institutional Prestige) were estimated and compared against the main effects model or null model.

The third stage involved testing of the hypothesized interaction effects of Ability to Pay and Social Integration, Ability to Pay and Academic Performance, and Ability to Pay and Goal Commitment. The simplified model produced in the second

stage was employed as a baseline to assist in the selection of the final model.

At each stage, model selection was based on assessments of the improvement of fit between the baseline model and an alternative model. Model selection was also guided by assessments of the statistical significance of the model's parameters[8].

The first model estimated is a simple additive model of the following form:

Model 1

$$\text{Log } (P_i/1-P_i) = B + B\ AP1 + \sum_{i=1}^{3} B_i\ AP2_i$$

where P_i represents the probability of the ith subject to persist given a set of explanatory variables. The B's represent parameters to be estimated from the data. AP1 stands for the categorical variable Satisfaction toward Cost of Attendance[9] and $AP2_i$ indicates the different categories associated to SES[10]. As suggested by Mare (1985), dummy variables were also employed to correct for bias due to missing values on each explanatory variable.

Model 2 corresponds to the presumed main effects associated to both economic and non-economic variables.

Model 2

$$\text{Log } (P_i/1-P_i) = B + B\ GC + \sum_{i=1}^{7} B_i\ AI_i + B\ SI + B\ AP1 + \sum_{i=1}^{3} B_i\ AP2_i + B\ IP + B\ SO + B\ AB$$

where GC refers to Goal commitment. AI_i stands for the seven indicators of Academic Integration; namely, AI1 Academic Performance, AI2 Faculty, AI3 Work Skills, AI4 Intellectual Growth, AI5 Intellectual Life, AI6 Quality Instruction and AI7 Curriculum, SI represents Social Integration, IP stands for Institutional Prestige, SO refers to Significant Others' Influence and AB stands for Skills and Abilities. As in the previous model, dummy variables were used to correct for bias due to missing values.

Models 3 and 4 conform with the hypothesized interactions between Academic Integration and Goal Commitment[11].

Model 3

$$\text{Log } (P_i/1-P_i) = B + B\ GC + \sum_{i=1}^{7} B_i\ AI_i + B\ SI + B\ AP1 + \sum_{i=1}^{3} B_i\ AP2_i + B\ IP + B\ SO + B\ AB + B\ AI1 \times GC + B\ AI3 \times GC + B\ A17 \times GC$$

Model 4

$$\text{Log } (P_i/1-P_i) = B + B\ GC + \sum_{i=1}^{7} B_i\ AI_i + B\ SI + B\ AP1 + \sum_{i=1}^{3} B_i\ AP2_i + B\ IP + B\ SO + B\ AB + B\ AI2 \times GC + B\ AI4 \times GC + B\ AI5 \times GC + B\ AI6 \times GC$$

Models 5 and 6 correspond to the hypothesized interactions between Academic Integration and Institutional Prestige.

Model 5

$$\text{Log } (P_i/1-P_i) = B + B\ GC + \sum_{i=1}^{7} B_i\ AI_i + B\ SI + B\ AP1 + \sum_{i=1}^{3} B_i\ AP2_i + B\ IP + B\ SO + B\ AB + B\ AI1 \times IP + B\ AI3 \times IP + B\ AI7 \times IP$$

Model 6

$$\text{Log } (P_i/1-P_i) = B + B\ GC + \sum_{i=1}^{7} B_i\ AI_i + B\ SI + B\ AP1 + \sum_{i=1}^{3} B_i\ AP2_i + B\ IP + B\ SO + B\ AB + B\ AI2 \times IP + B\ AI4 \times IP + B\ AI5 \times IP + B\ AI6 \times IP$$

The corresponding scaled deviance (G^2) statistics, an indication of the goodness of fit (Fienberg, 1983; Freeman,

1987), was also estimated for each model.

Results

Findings are organized into three sections. The first section reports the results of a model containing the indicators of ability to pay alone. The second section reports the results of testing the presumed interaction effects among non-economic variables, and discusses the simplified model employed as a baseline for subsequent analysis. The third section describes the results of testing for the hypothesized interaction effects between ability to pay and motivational and institutional variables.

Section I

The results of the first model are presented in Table 2. Findings support priori expectations. Students satisfied with the cost of college attendance were less likely to withdraw than dissatisfied students. Moreover, students from upper SES quartiles, with the exception of those located at the second quartile, were more likely to persist than students from the lowest SES quartile.

Insert Table 2 about here

The next two sections report the results of models exploring the effects of ability to pay on persistence when other variables are taken into account.

Section II

Table 3 displays the results of testing for the presumed interaction effects between motivational and institutional variables. Models 3 and 4 correspond to the hypothesized interaction of Academic Integration and Goal Commitment. Models 5 and 6 examine the interaction effects between Academic Integration and Institutional Prestige. For each model, the scaled deviance (G^2) and degrees of freedom are reported. The last row displays the p-value associated with the improvement of fit of the respective interaction model relative to the simple additive model.

Insert Table 3 about here

The hypothesis that Academic Integration interacts with Goal Commitment in shaping persistence decisions was not supported. Neither of the models (models 3 and 4) testing this hypothesis

Table 2

Logistic Regression Results

Ability to Pay
(Model 2)

Variables	$\hat{\beta}$
Constant	0.641 (0.153)
Ability to Pay	
Satisfaction Cost Attendance:	
Dissatisfied vs Satisfied	0.254 * (0.135)
Socioeconomic Status:	
1st quartile vs 2nd quartile	0.254 (0.189)
1st quartile vs 3th quartile	0.317 * (0.176)
1st quartile vs 4th quartile	0.456 ** (0.170)

N = 1375 G^2 = 1543 df = 1368 "R^2" = .141

*p < .05 one-tailed; **p < .01 one-tailed

Table 3

Comparison of Models

Model	df	G^2	ΔG^2	Improvement of Fit (p - value)
Additive Model				
2. [AP] [GC] [AI] [SI] [IP] [SO] [AB]	1344	1338	----	----
Academic Integ. X Goal Commitment				
3. [AI1 GC] [AI3 GC] [AI7 GC]	1341	1334	$G_2^2 - G_3^2 = 4$	0.262
4. [AI2 GC] [AI4 GC] [AI5 GC] [AI6 GC]	1340	1337	$G_2^2 - G_4^2 = 1$	0.910
Academic Integ. X Institutional Prestige				
5. [AI1 IP] [AI3 IP] [AI7 IP]	1341	1335	$G_2^2 - G_5^2 = 3$	0.392
6. [AI2 IP] [AI4 IP] [AI5 IP] [AI6 IP]	1340	1333	$G_2^2 - G_6^2 = 5$	0.287
Institutional Prestige X Satisfaction with Faculty				
7. [AI2 IP]	1343	1334	$G_2^2 - G_7^2 = 4$	0.046

Note: Following Fienberg's (1983) notation, main effects and interaction terms are identified with brackets. Interactions between an indicator of a given variable (say Academic Performance) and another variable (say Goal Commitment) are expressed as [AI1 GC]. Although not shown, all main effects corresponding to economic and non-economic variables are included whenever interactions are estimated.

showed an improvement of fit relative to the simple additive model. Further, none of the relevant interactions contained in models 3 and 4 produced significant results[12].

Likewise, none of the models presuming interaction effects between Academic Integration and Institutional Prestige (models 5 and 6) were significant as compared to the simple additive model. However, an examination of the two-factor interactions in model 6 indicates a significant interaction effect between Satisfaction with Faculty (AI2) and Institutional Prestige. This finding suggests a model involving an interaction between these two variables might better represent the data relative to the simple additive model. Accordingly, a new model was estimated (model 7). This model shows an improvement of fit significant at .05.

Since five indicators of Academic Integration (AI3, AI4, AI5, AI6 and AI7) failed to show significant effects across all models, it was presumed that their exclusion would not worsen the fit of the Faculty X Institutional Prestige model. Accordingly, a new model (model 8) that omitted these five indicators was fitted and contrasted with model 7. The results support this expectation. The reduction of parameters ($df_8 - df_7 = 10$) did not significantly worsen the fit of the model ($G^2_8 - G^2_7 = 1346-1334 = 12$; df = 10; p-value = .285). The resulting trimmed model (model 8) was retained and employed to test for the presumed interaction effects involving Ability to Pay. Results for the latter set of models are described in the next section.

Section III

Table 4 indicates that relative to model 8 none of the models incorporating interaction effects between Ability to Pay and Social Integration (model 9), and Ability to Pay and Academic Performance (model 10) fits the data better. Moreover, none of the relevant interactions involving Ability to Pay, contained in models 9 and 10, was statically significant.

Insert Table 4 about here

A significant improvement of fit relative to model 8 (p = .06) was observed when the model hypothesizing interactions effects between Ability to Pay and Goal Commitment (model 11) was fitted to the data. An examination of the parameters in model 11 revealed that only the interaction between Satisfaction with Cost of Attendance (AP1) and Goal Commitment was significant. Accordingly, a new model incorporating this interaction was fitted to the data (model 12). Results indicated that this model (model 12) is a better representation of the data relative to the Faculty X Institutional Prestige model (model 8). The improvement of fit is significant at .02.

Table 4

Comparison of Models

Model	df	G^2	ΔG^2	Improvement of Fit (p - value)
Satisfaction with Faculty X Institutional Prestige				
8. [AI2 IP]	1353	1346		-----
Ability to Pay X Social Integration				
9. [AI2 IP] [AP1 SI] [AP2 SI]	1347	1343.8	$G_8^2 - G_9^2 = 2.2$	0.900
Ability to Pay X Academic Performance				
10. [AI2 IP] [AP1 AI1] [AP2 AI1]	1347	1338.3	$G_8^2 - G_{10}^2 = 7.7$	0.261
Ability to Pay X Goal Commitment				
11. [AI2 IP] [AP1 GC] [AP2 GC]	1347	1333.7	$G_8^2 - G_{11}^2 = 12.3$	0.057
Satisfaction with Cost Attendance X Goal Commitment				
12. [AI2 IP] [AP1 GC]	1351	1338.2	$G_8^2 - G_{12}^2 = 7.8$	0.020

Note: Following Fienberg's (1983) notation, main effects and interaction terms are identified with brackets. Interactions between an indicator of a given variable (say Academic Performance) and another variable (say Goal Commitment) are expressed as [AI1 GC]. Although not shown, all main effects corresponding to economic and non-economic variables are included whenever interactions are estimated.

Table 5 presents the maximum likelihood parameter estimates corresponding to the final model (model 12). Standard deviations are reported within parenthesis. Significance levels, scaled deviance (G^2), degrees of freedom and the pseudo-R^2 (see Maddala, 1987) are also displayed.

Insert Table 5 about here

As shown in table 5, model 12 accounted for 23% of the variance in persistence. This result compares well with the extant literature (Munro, 1981, R^2 = .14 and .15; Pascarella & Terenzini, 1983, R^2 = .18 to .20; Pascarella and Chapman, 1983, R^2 = .11 to .15; Pascarella, Duby & Iverson, 1983, R^2 = .16 to .28; Pascarella, Terenzini & Wolfle, 1986, R^2 = .20; Nora, 1987, R^2 = .42).

Support is found for the hypothesized effects of Ability to Pay on persistence. Results indicate that subjects located in the second highest (3rd) SES quartile were less likely to withdraw than those located in the lowest (1st) SES quartile. Although marginally significant, results also indicate that subjects located in the highest (4th) SES quartile were less likely to withdraw than those located in the lowest (1st) SES quartile. No statistical difference in the propensity to persist was observed between subjects located in the lowest (1st) SES quartile relative to those located in the second lowest (2nd) SES quartile.

Results also indicate that Ability to Pay moderates the effects of motivational variables on the propensity to persist. Figure 2 illustrates the predicted effects of the interaction between Satisfaction toward Cost of Attendance and Goal Commitment on the logit of persistence across each SES quartile while holding constant the rest of the variables at their mean value in the corresponding quartile. Here we see that students dissatisfied with the cost of attendance (a minority of students) were slightly more likely to persist than satisfied students as long as their educational aspirations fell short of obtaining a bachelor degree. This trend was reversed, however, for students aspiring for a bachelor's or higher degree[13].

Insert Figure 2 about here

Results also support several hypotheses derived from the Student Integration Model and the pilot studies. Students satisfied with the social component of the institution were less likely to withdraw. Also, encouragement from Significant Others

Table 5

Logistic Regression Results

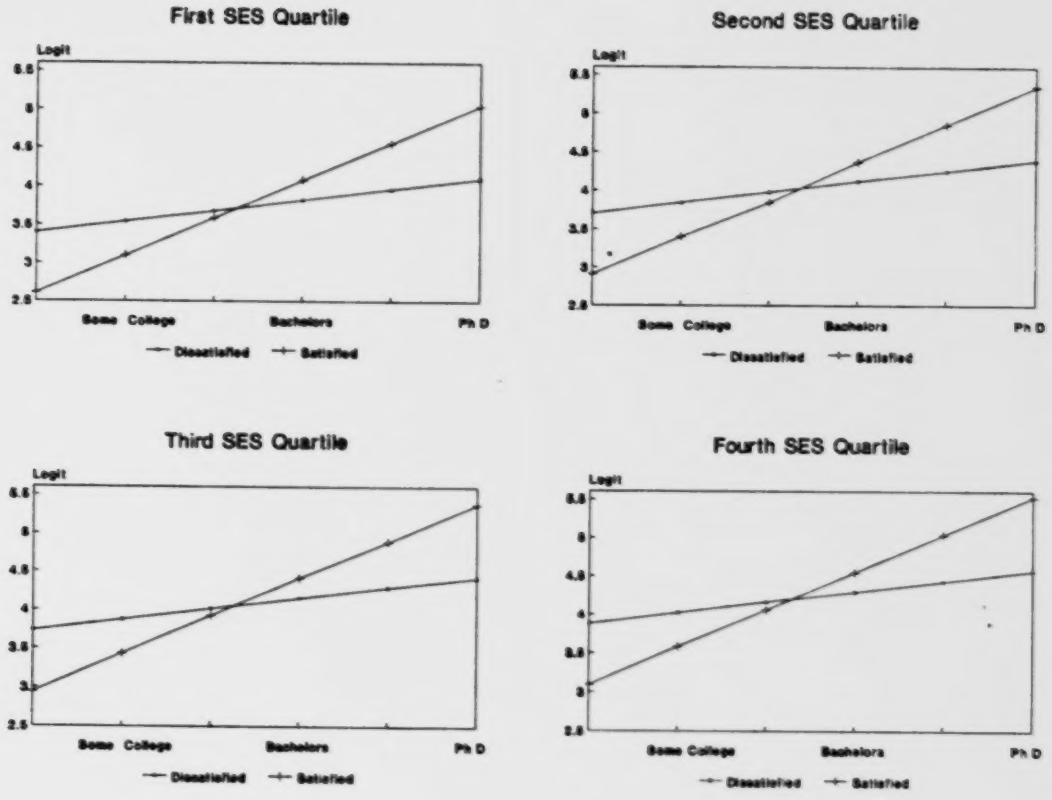
Faculty X Institutional Prestige,
Cost Attendance X Goal Commitment Model
(Model 12)

Variables	$\hat{\beta}$
Constant	1.208 (1.376)
Skills & Abilities	-0.029 (0.011)
Significant Others' Influence	0.096** (0.054)
Goal Commitment	0.138 (0.125)
Academic Integration:	
Academic Performance	1.475*** (0.136)
Faculty	-0.480 (0.226)
Social Integration	0.117** (0.069)
Institutional Prestige	-0.296 (0.239)
Ability to Pay:	
Satisfaction Cost Attendance:	
Dissatisfied vs. Satisfied	-1.142 (0.575)
Socioeconomic Status	
1st quartile vs. 2nd quartile	0.307 (0.208)
1st quartile vs. 3rd quartile	0.317** (0.195)
1st quartile vs. 4th quartile	0.289* (0.193)
INTERACTIONS	
Faculty x Institutional Prestige	0.130*** (0.059)
Goal Commitment x Satisfaction Cost Attendance	0.350*** (0.147)
N = 1375 G^2 = 1338.2 df = 1351 "R^2" = .229	

*p < .07 one-tailed; **p < .05 one-tailed; ***p < .01 one-tailed

Figure 2

Moderator Effects
of
Satisfaction Toward Cost of Attendance



was positively related to persistence. Concerning the role of Academic Integration, it was found that the higher the academic performance, the lower the propensity to withdraw. Support was also found for hypotheses presuming that both Academic Integration and Institutional Prestige affect persistence. Finally, no support was found for the hypothesized effect of skills and abilities; the cognitive test failed to discriminate between persisters and non-persisters.

Discussion

This study addressed a single, but highly important, policy question; what are the effects of ability to pay on college persistence when academic ability, motivational and institutional variables included in the Student Integration Model are taken into account. To test this question, a model specifying the role of ability to pay was developed. This model, basically, expands Tinto's Student Integration Model by making explicit the potential moderating effects of ability to pay on college persistence. Accordingly, it was hypothesized that ability to pay not only directly affects persistence, but also moderates the effects of other non-economic variables presumed to affect persistence.

Effects of ability to pay were significant not only when the variable was considered alone, but also when other variables were incorporated into the analysis. When the effects of ability to pay are examined by themselves (see Table 2), findings were quite consistent with expectations derived from both economic theory (Baum, 1987) and prior research on the effects of student financial aid. Not only were students dissatisfied with the cost of attendance more prone to withdraw from college, but also students' socioeconomic status displayed a monotonically increasing association with persistence, whereby the higher the SES, the less likely the student is to withdraw.

The fact that the monotonic association between SES and persistence is not observed when other variables are incorporated into the analysis deserves explanation (see Table 5). The results might reflect a statistical artifact associated with missing values; although controls were included for missing values in each variable, listwise selection of valid cases was unavoidable when the interaction among variables was included in the estimation process. On the other hand, results might also be attributable to the quality of the self-reported information; analyses by Fetters, Stowe and Owings (1984) on the HS&B data base indicate that the validities for wealth variables (i.e; income) employed in the computation of the SES scale are greater for the lowest than for the highest SES quartile.

Regarding the presumed interactions between Ability to Pay and the other variables, results support the hypothesis that Ability to Pay moderates the effect of Goal Commitment upon persistence in a manner consistent with the expanded model.

However, no evidence was found supporting the hypotheses that Ability to Pay moderates the effect of either academic performance or social integration on a student's decisions to persist. The latter finding, coupled with the significant Ability to Pay X Goal Commitment interaction, conforms with Tinto's (1975) claim that external factors, such as ability to pay, are likely to moderate the effects of goal and institutional commitments.

Concerning the role of Academic Integration and Social Integration, findings conform with the Student Integration Model and with previous research employing discriminant analysis to test the model's propositions (Pascarella & Chapman, 1983; Pascarella & Terenzini, 1980, 1983; Getzlaf et al., 1984).

Contrary to the Student Integration Model, no support was found for the presumed Academic Integration X Goal Commitment interaction effect. This finding, however, is compatible with previous research on the Student Integration Model. Munro (1981), for example, found no effects of academic integration on educational aspirations. Also, Pascarella and Chapman (1983) found a negligible association between Academic Integration and Goal Commitment. More recently, Terenzini and Wright (1987), while examining the effect of academic and social experiences on personal growth, reported no association between precollege educational aspirations and college academic integration experiences.

An interesting but complex finding is the significant effect on persistence by the interaction between satisfaction with faculty and satisfaction with institutional prestige. Although this finding is consistent with the extant literature about the effect of student-faculty interactions (Pascarella & Terenzini, 1977; Pantages & Creedon, 1978; Pascarella & Terenzini, 1980) and that of institutional selectivity on persistence (Astin, 1985), results indicate that the joint effect between these two variables also explains persistence decisions. The significant interaction also parallels previous research indicating a close association between perceptions of faculty and institutional quality (Theophilides & Terenzini, 1981).

The lack of an effect on persistence by skills and abilities (as measured by a cognitive test) was unexpected. Not only does theory (Tinto, 1975, 1987) predict a lasting effect of skills and abilities, but also Baum (1987), working on the same HS&B data base employed in this study, found that the cognitive test (taken in high school) predicted this behavior during the first two years of college. A plausible explanation for this finding is sample mortality. Baum focussed on college freshmen whereas this study focussed on students at the end of their second academic year; thus, many students with low scores in the cognitive test may have withdrawn from college after their freshman year, while

survivors with low scores may have made a successful adjustment to college. Evidence supporting this possibility is provided by Stampen and Cabrera (1986) who found precollege ability characteristics more predictive of persistence in the freshman year than in subsequent academic years. On the other hand, the significant effect of college GPA in this study suggests that college academic performance replaces standardized tests scores as an indicator of relevant skills and abilities by the end of the second college year.

Conclusions

The results of this study support the original proposition on which this study was based. Findings clearly indicate that our understanding of the role of finances in college persistence is enhanced when theories of college behavior are brought into consideration (Pantages & Creedon, 1978). In this respect, the Student Integration Model was particularly helpful in providing a context for exploring the effects of finances along with the effects associated with non-economic variables.

The finding that Ability to Pay has a direct effect on college persistence is not surprising in view of economic theory and previous research. However, the finding that Ability to Pay moderates the effect of educational aspirations is unexpected. No previous research had attempted to examine empirically the potential moderating effects of finances on goal and institutional commitments. Furthermore, the finding contradicts the common assumption that a student's commitment to finish college can overcome the lack of financial resources (Cope & Hannah, 1975).

Overall, the picture emerging from the analysis suggests that ability to pay is best understood as an external factor that directly affects decisions to persist, while, at the same time, moderates the effect of goal commitment and institutional commitment[14]. Findings also suggest that other variables also affect persistence, and that the effect of institutional experiences is independent from students' finances.

Limitations

The findings are likely to underestimate the effects of finances on persistence, because results are based on a sample of students at the end of their second academic year as opposed to freshmen. Literature reviews by Porter(1986) and Stampen (1980) suggest that financial support may be particularly critical to college persistence during the first academic year.

Examination of the short term effects that economic and non-economic variables have on college persistence was limited by the data collection strategy employed in the development of the HS&B

data base. While the literature indicates that analyses based on one year academic periods (Stampen & Cabrera, 1986; Terenzini & Wright, 1987) are likely to uncover specific patterns among economic and non-economic variables, the HS&B data base employs a two-year collection period (Jones, et al., 1986a).

The absence of indicators in the HS&B data base regarding institutional commitment constrained the study's ability to test the whole expanded model. Thus, the hypothesized moderator effects of Ability to Pay on the relationship between Institutional Commitment and college persistence could not be tested. Likewise, it was not possible to submit to empirical examination the presumed interaction between institutional commitment and social integration, and that between institutional commitment and institutional prestige.

Finally, results may also be limited by the quality of surrogates. Surrogates for academic integration show moderate correlations with the scales developed by Pascarella and Terenzini (1980). The lack of a significant interaction effect between Academic Integration and Goal Commitment might also be attributed to the this problem. On the other hand, results are also likely to underestimate the effects of Goal Commitment. The organizational behavior literature defines goal commitment in terms of the intensity of the importance of the goal, the effort the subject is willing to invest in securing such a goal, and the difficulty of the goal itself (Dunham, 1984). In this context, the surrogate employed in this study, educational expectations mirrors, at best, one component at this construct; namely, goal difficulty.

Strengths

The strengths of the study derive primarily from the theoretical framework followed and the research design employed. More so than in previous research on financing, this study followed a tested conceptual framework describing college persistence behavior. Further, the examination of the presumed effects of ability to pay benefited from additional information secured via pilot studies. The additional information enabled assessment of the convergent validity between factors suggested by the literature and those suggested by college students.

The research design also strengthened this study. Findings promise to be more stable since information concerning attitudes and motivations was secured when the student was still attending college. In this respect, special care was taken to verify that students' academic and social experiences matched the institution from which the students, two years later, reported persistence or withdrawal. Moreover, findings can be generalized because the analyses are based on a national longitudinal data base.

Multiple sources of information were employed to secure a representative sample and reliable data. Special attention was placed on verifying information about academic status and type of institution attended. Emphasis was also placed on documenting the convergent validity of the HS&B's items relative to the Academic Integration and Social Integration scales developed by Pascarella and Terenzini (1980).

Finally, the estimated effects of logistic regression analysis promise to be more reliable and valid than those using OLS techniques. As compared to OLS techniques, logistic regression analysis is more parsimonious with the dichotomous nature of the dependent variable.

Implications

This study, while somewhat constrained by available data, contributes to theory by offering an improved framework for understanding how finances affect college persistence. In this respect, findings indicate that understanding the role of ability to pay can be enhanced by simultaneously considering economic and non-economic theories. Future research attempting to combine both theories should consider employing the expanded version of the Student Integration Model developed in this study as a starting point.

The study has several important implications for public policy. Public investment in student financial aid allocates funds primarily on the basis of economic need under the assumption that ability to pay is important for college attendance (Jensen, 1981). Yet, policy makers have relied on indirect evidence to examine the validity of this assumption (Stampen and Cabrera, 1988). This study contributes to policy evaluation by offering an approach which enables one to study the effects of ability to pay in a direct manner. However, the results of this study underscore the need on the part of policy makers to modify their expectations that monetary aid alone is sufficient to prevent students from dropping out (Baum, 1987; Stampen & Cabrera, 1986, 1988). The results indicate that students' commitment, support from significant others', and the degree to which the student fits the academic and social components of an institution are also important factors in explaining college persistence.

The study also helps to focus more sharply on the effects of student aid programs. Previous research of this type, with the exception of Voorhees' (1985), has emphasized the impact of aid packages without regard as to how these programs may affect variables involved in the college persistence process (Porter, 1986; Stampen and Cabrera, 1986). The results suggest, then, that research on the effects of student aid programs can profit by examining how different aid packages affect student

commitment, academic performance, or social integration with the institution. In this respect, Hossler (1984) and Stampen and associates (1986, 1988) have suggested that one of the chief reasons why recipients of work study and merit grants are less likely to withdraw is the exposure that such programs bring to the academic and social components of the institution.

The literature emphasizes the importance of singling out the determinants of college persistence so that institutional programs can be initiated to retain students (Kauffman, 1984; Pantages & Creedon, 1978; Pascarella & Terenzini, 1980; Tinto; 1987). In this respect, the results provide potential criteria not only for developing programs, but also for assessing the effectiveness of on-going student retention programs. The findings suggest that programs that focus on the academic ability of the student, or that aim at enhancing interactions with faculty and peers, are likely to improve a student's propensity to persist. Specific studies are required, however, to validate whether these findings are applicable to the specific institutional settings before being translated into organizational practices.

Finally, this study underscores the need to improve national and institutional data bases. Instead of relying on "ad hoc" instruments, institutional researchers should consider developing or employing instruments that evolved out of theory, and whose validity and reliability is well documented. Not only does this mean that results can be compared across different studies, but also findings are more likely to address research questions properly. As an example, the instruments developed by Pascarella, Terenzini and associates appear useful for such purpose because of their reliability and validity. Data collection should also parallel the specific periods when institutional and personal characteristics are more likely to exhibit their strongest effects on college persistence. In this respect, annually collected data would help to identify short term effects as well as recurring effects among motivational and ability variables (Stampen & Cabrera, 1986; Terenzini & Wright, 1987). Emphasis should also be placed on developing additional sources of information. For this particular study, the availability of institutional transcripts was important for verifying the quality of the self-reported information.

Table A

CONCURRENT VALIDITY MATRIX

STUDENT SATISFACTION & STUDENT INTEGRATION MODEL

STUDENT INTEGRATION MODEL
(CONSTRUCTS & INDICATORS)

		ACADEMIC INTEGRATION		SOCIAL INTEGRATION
	Academic & Intellectual Development (r_{xx} = .67)	Faculty Concern (r_{xx} = .74)	Interactions With Faculty (r_{xx} = .74)	Peer-Group Interaction (r_{xx} = .81)
Satisfaction toward:				
Faculty	0.389	0.452	0.274	0.075
School Social Life	0.218	0.134	0.149	0.551
Development of Work Skills	0.418	0.398	0.367	0.091
Intellectual Growth	0.489	0.319	0.221	0.194
Counseling or Job Placement	0.094	0.193	0.151	0.132
Buildings, Library Equipment	0.156	0.225	0.132	0.052
Cultural Activities	0.143	0.159	0.116	0.175
School Intellectual Life	0.416	0.319	0.218	0.182
Course Curriculum	0.345	0.297	0.237	-0.027
Quality of Instruction	0.470	0.478	0.334	0.148
Sports and Recreation Facilities	0.010	0.099	-0.002	0.203

*p < .05 two-tailed **p < .01 two-tailed

Note: Entries are pairwise correlations. The minimum pairwise N is 222 and the maximum pairwise is 225. Reliabilities are shown within parenthesis.

Notes

1.In the 1983-84 academic year, for instance, 89% of the total student aid dollars at public colleges and universities were distributed to students on the basis of demonstrated economic need (Stampen, 1985)

2.These indicators are Satisfaction with Faculty and Satisfaction with the Development of Work Skills.

3.Two pilot studies were conducted by the authors on late fall 1986. The first aimed at providing evidence about which items contained in the High School & Beyond (HSB) data base could be used as surrogates for the Student Integration instruments as developed by Pascarella and Terenzini (1980). This study also explored the potential effects of Ability to Pay and Institutional Prestige in the Student Integration Model. The second study aimed at identifying additional variables potentially affecting persistence. Table A displays pairwise correlations between the HSB items and the items contained in the Student Integration Questionnaire. As a whole, six HSB items showed concurrent validities with the Academic Integration scale. Only one HSB item correlated with the Social Integration Scale. No surrogates were found for the construct of Institutional Commitment.

4.Logistic regression analysis for microdata is appropriate because it allows for both continuous and categorical explanatory variables to be mixed together (Hanushek & Jackson, 1977).

5.The original called plan for the use of LISREL. Preliminary analyses, however, indicated that the distribution of the dependent variable, when measured in terms of number of academic months the student attended college, was not normally distributed. Moreover, the highly skewed distribution suggests that the dependent variable follows a Bernoulli distribution. Consequently, we concluded that use of LISREL would not only produce misleading results, but would be inconsistent with the underlying probabilistic distribution associated to college persistence. Use of logistic regression analysis avoids these problems (see Baker & Nedler, 1978; Hanushek & Jackson, 1977; Freeman, 1987; Weiler, 1987).

6.The authors are indebted to Robert Mare (Department of Sociology, University of Wisconsin-Madison) for having suggested this strategy.

7.The selection of the additive model as a baseline is supported by both substantive and statistical reasons. From a theoretical perspective, the additive model provides a plausible alternative explanation as to how economic and non-economic variables affect persistence. From a statistical perspective, the comparisons between interaction models and the additive model are feasible because the former are nested in the latter.

8.Because this study's hypotheses were directional, all significance tests were one-tailed.

9.Since this is a categorical variable, the resulting parameter denotes the contrast between the excluded category (i.e; dissatisfied students) and the present one (satisfied students).

10.Since SES is a categorical variable, parameters represent the contrast between the lowest SES category and the corresponding highest SES category.

11.The GLIM version 3.0 employed to test hypotheses did not allow for a simultaneous testing for all interactions between the seven indicators of Academic Integration and the corresponding variable. Consequently, it was necessary to develop two models for the two-factor interaction hypotheses whenever Academic Integration was involved.

12.Results for each logistic regression are available from the first author upon request.

13.A comparison of the coefficients for Satisfaction with Cost of Attendance (AP1) in model 1 (Table 2) and in model 12 (Table 5) seems to support conflicting conclusions about the effect of AP1 on persistence. The positive coefficient in model 1 means that satisfied students were more likely to persist than students dissatisfied with the cost of attendance. The negative coefficient associated in model 12 suggests the opposite. However, a direct comparison of the AP1 coefficient across these two models is inappropriate for two reasons. First, the two models address two different research questions. Model 1 tests for the total effects of each indicator of

Ability to Pay, which includes Satisfaction with Cost of Attendance and SES, on college persistence. Model 12 tests for the indirect effects of Satisfaction toward Cost of Attendance through Goal Commitment. Second, the significant interaction between Satisfaction toward Cost of Attendance and Goal Commitment makes the use of the coefficients associated to AP1 and Goal Commitment inappropriate for simultaneous analysis. Cohen (1978) demonstrates that the partial coefficients for individual variables appear distorted whenever their products are estimated as is the case in model 12. In order to interpret interaction effects in logistic regression, Hare (1985) suggests the use of illustrative graphs or tables.

14.Although the lack of indicators prevented the empirical examination of the interaction between finances and institutional commitment, from a cost benefit perspective such interaction is likely to exist. The student is likely to be less committed to the institution to the extent that the costs of attendance make alternative activities such as full-time employment or the choice of another educational institution more appealing.

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